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S. R. Conley

February 18, 1986

Mr. H.M. Shaver, Jr.
State Location & Design Engineer
Commonwealth of Virginia
Department of Highways & Transportation
1221 East Broad Street
Richmond, Virginia 23219

**Re: CIA Entrance at Route 123 - Phase II
Comparative Evaluation of Signalized Intersections
Route 193 Intersection with Route 123**

Dear Mr. Shaver:

Furnished, as an attachment to this letter, is a detailed comparison of the traffic signal system associated with two alternative designs for the referenced Project. The first alternative evaluated is our proposed design as submitted to the Department previously and which corresponds to the Alternative 2 Plan adopted for project implementation. The other design evaluated, designated Alternative B, involves an offset between Route 193 and the Potomac School Road intersections along the axis of Route 123. The latter scheme evolved out of discussions at the CIA Advisory Task Force Meeting held on January 29, 1986.

Also furnished during our meeting of February 19th are prints of drawings showing the Proposed Design and Alternatives A and B as well as prints of cross sections showing berm widths and heights which would result from implementation of either of the three alternatives.

Prints of alternative berm treatments are also furnished. These depict increases in height of berm or screening which could result from changes in cross section, slope rate, or from installation of a precast concrete panel screen wall. Lastly, we are furnishing a qualitative evaluation of the three plans in which we list advantages and disadvantages of each.

In summary, the proposed design provides a significantly better level of service for traffic operations along Route 123 when compared with the offset intersection design (Alternative B). Incremental increases in delay range between 22% and 78% and levels of service drop from D to E with the offset intersection. Another very significant disadvantage of the offset design is that it is not readily widened from two to three lanes in each direction should that eventuality arise.

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Mr. H.M. Shaver, Jr.

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I trust that the enclosed material satisfactorily provides the information which you requested.

Yours very truly,

DEWBERRY & DAVIS

A handwritten signature in cursive script, appearing to read "John P. Fowler, II".

**John P. Fowler, II, P.E.
Managing Principal**

JPF:rad

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CIA ENTRANCE AT ROUTE 123 - PHASE II
QUALITATIVE COMPARISON OF ALTERNATIVES

Description of Alternatives

Proposed Design

Route 193 aligned opposite Potomac School Road at intersection with Route 123. About 200' of tangent approach on Route 193.

Alternative A

Route 193 aligned opposite Potomac School Road at intersection with Route 123. Route 193 approach to intersection on curve.

Alternative B

Route 193 intersection with route 123 offset about 80' east of potomac School Road intersection. Route 193 approach to intersection on tangent with a 90° angle of intersection.

	<u>Advantages</u>	<u>Disadvantages</u>
Proposed Design	<p>Best combination of alignment and signal installation</p> <p>Can be readily widened</p> <p>Provides minimum acceptable level of service</p>	<p>Closest to Evermay Section VII</p>
Alternative A	<p>Provides slightly greater separation from Evermay - Section VII</p>	<p>Unsatisfactory approach alignment on Route 193</p> <p>Unsafe for tandem left design</p> <p>Slight impact on signal efficiency - difficult to quantify</p>
Alternative B	<p>Best approach alignment for Route 193</p> <p>Greater separation to Evermay - Section VII</p>	<p>Unacceptable levels of service for signal installation - as measured by delays</p> <p>Widening to three lanes each way difficult to accomplish</p> <p>Intersection channelization and signing is complicated and difficult to do effectively</p>



**COMPARISON OF SIGNAL INSTALLATION
PROPOSED DESIGN AND ALTERNATIVE B**

RATING OF OVERALL INTERSECTION

	<u>AM PEAK HOUR</u>	<u>PM PEAK HOUR</u>
PROPOSED DESIGN		
Average Delay	37.6 sec./veh.	29.6 sec./veh.
Level of Service	D	D
No. of Vehicles	4,414	5,821
ALTERNATIVE B		
Average Delay	46.0 sec./veh.	52.8 sec./veh.
Level of Service	E	E
No. of Vehicles	4,414	5,821
Increase in Delay	+22%	+78%

ROUTE 123

<u>PEAK HOUR DIRECTION FLOW</u>	<u>EASTBOUND 123</u>	<u>WESTBOUND 123</u>
PROPOSED DESIGN		
Average Delay	25.0 sec./veh.	29.7 sec./veh.
Level of Service	C	D
No. of Vehicles	2,232	3,953
ALTERNATIVE B		
Average Delay	31.0 sec./veh.	50.8 sec./veh.
Level of Service	D	E
No. of Vehicles	2,232	3,953
Increase in Delay	+24%	+71%

<u>AVERAGE DELAY</u>	<u>ROUTE 193</u>	<u>POTOMAC SCHOOL RD.</u>
No. of Vehicles	1,503	443
Average Delay:		
Proposed Design	74.8 sec./veh.	65.5 sec./veh.
Alternative B	102.2 sec./veh.	92.6 sec./veh.
Percent Greater	37%	41%

Alternative B Level of Service
Delays on Alternative B

Assumption:

PROPOSED DESIGN: 3 seconds for all yellow phases, aggregate 12 seconds lost time.

ALTERNATIVE A: 4 seconds for southbound turn yellow, aggregate 13 seconds.

ALTERNATIVE B: 5 seconds to east and west and north and south through yellow, aggregate 18 seconds.

Therefore, delays on A about 1/6 of difference between Proposed Design & Alternative B greater than Proposed Design.
(i.e., cycle time increases).